KENTUCKY Council on postsecondary education

HB 572 Knowledge-based Economy Programs

2002-03

October 15, 2003

Council on Postsecondary Education

Annual Report

House Bill 572 Knowledge-based Economy Programs

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I. Executive Summary

The Kentucky Innovation Act, House Bill 572, 2000 Regular Session, created knowledge-based economy programs housed in the Council on Postsecondary Education and Cabinet for Economic Development. The legislation supported research and development programs and provided funding necessary to create, attract, incubate, and grow high-tech and biotech firms, and to modernize existing manufacturing services.

HB 525, 2002 Regular Session, calls for the Council to submit an annual report on the knowledge-based economy programs to the Kentucky Innovation Commission, the Governor, and the General Assembly. The report is to include progress made in achieving each program's purposes, qualitative and quantitative information concerning the applications received, projects approved and undertaken, companies served, funding amounts invested in each project or program, and findings and recommendations to increase each program's effectiveness.

The following list briefly describes knowledge-based economy programs for which the Council has responsibility, and features a few of each program's investments.

- The R&D Voucher program
  - $3 million investment fund;
  - Enables small and medium-sized Kentucky-based firms to undertake research and development in partnership with Kentucky university researchers;
  - Invests in technology refinement, prototype development, and commercial product development;
  - $200,000 set aside in an Early Concept Pool to provide initial funds to emerging companies, products, and technologies;

  Spotlight
  - High Tide Technologies, through its partner, The Center for Water Resource Studies at Western Kentucky University, will use this funding to complete research and development on a proprietary sanitary sewer overflow monitoring system, which will wirelessly transmit flow, level, and rainfall information to customers. This market is being driven by recent regulations promulgated by the US Environmental Protection Agency to control and eliminate sanitary sewer overflows caused by rainfall infiltration and inflow into municipal sewer systems;

- The Rural Innovation program

- $1 million investment fund;
- Assists small, rural, Kentucky-based firms to undertake research and development;
- Funds must be used in partnership with a university or an appropriate third party;
- Investments made in developing proof of concept and early stage prototyping;

Spotlight

- Design Technology (Kuttawa, Lyon County) developed an innovative woodworking commercial automation system applicable to a wide range of industrial and commercial automation. Simple direct commands cause exact location changes for precision machine operation;
- Global Technology Services (Paintsville, Johnson County) modified and enhanced the Computerized Training Management System (CTMS), a patented process and software tool, and use it to train and qualify rural utilities' staff and homeland security response teams responsible for preventing and combating biological and chemical weapons in water systems.

- The Commercialization program
  - $750,000 investment fund;
  - Limited to university faculty who want to translate their research into marketable products;

  Spotlight
  - Researchers at Western Kentucky University are developing a new class of materials derived from natural products. Using a patented and newly developed processing approach, wood is used to produce carbon-polymer composites with unique characteristics suitable for the specialty wood-products market.

- The Kentucky Science and Engineering Foundation
  - $1,770,600 investment fund;
  - Builds research and development excellence in Kentucky's priority research focus areas;

  Spotlight
  - All cells of the body require oxygen to keep cells alive. Many life-threatening conditions, such as heart attack, stroke, and surgical procedures involve ischemia (low oxygen), which can cause death. Dr. William Ehringer at the University of Louisville School of Medicine has found a way to deliver energy directly to cells and bypass the need for oxygen;
  - Western Kentucky University's Dr. Cathleen Webb developed a novel, inexpensive, arsenic-removal system for rural and home drinking water supplies.

- The Experimental Program to Stimulate Competitive Research (EPSCoR)

- $2,751,000 fund used to match federal research dollars;
- Created to enhance university scientists and engineers' capacity to compete for federal research dollars;

Spotlight

- $2.1 million in space-related R&D funding obtained by Kentucky NASA EPSCoR supports faculty and students at the University of Kentucky, University of Louisville, Murray State University, and Western Kentucky University. Kentucky was one of only four states to receive the maximum amount of funds available;
- Using Kentucky Department of Energy EPSCoR support, Western Kentucky University developed a sensitive elemental detection system based on nuclear physics R&D. The intellectual property created is now commercialized within an online coal characterization instrument at the Tennessee Valley Authority, used by United Nations peacekeepers to locate small land mines, and applied by the European Union to locate and identify chemical agent weapons;
- In follow-on, sustained funding after receiving a Kentucky NASA EPSCoR grant, university researchers secured $7.3 million in grants, produced 55 refereed and 126 other publications, and developed five additional invention disclosures and patent applications. The return on investment for state funds to NASA EPSCoR is 9:1.

Table 1. Knowledge-based Economy Program Summary, 2002-03

	2003 Appropriation	*# of Awards*	*Amount Awarded*	*Admin Costs**	*Balance***
Early Concept	200,000	4	99,912	4,706	95,382
R&D Voucher	2,800,000	5	500,000	146,956	2,153,044
Rural Innovation	1,000,000	32	276,000	101,880	622,120
Commercial-ization	750,000	2	149,999	76,218	523,783
Regional Tech Corp***	500,000	0	0	0	0
	5,250,000	**43**	**1,025,911**	**329,760**	**3,894,329**
KSEF^	1,770,600	53	2,155,870	477,514	(862,784)
EPSCOR	2,751,000	78	2,631,000	188,000	^^(68,000)
	9,771,600	**174**	**5,812,781**	**995,274**	**2,963,545**

* Salaries, benefits, and subcontracts only, does not include 18.3% indirect cost charged to each program
** Excludes interest earned
*** RTC program was established in 2000 and repealed and recreated as ICCs in 2002. The appropriation was transferred to the Office of the New Economy.
^ Award total includes SBIR grants not part of state appropriation and $1,496,773 2001-02 carry forward
^^ Paid from unused 2001-02 administrative funds

Complete fund portfolios can be found on the Kentucky Science and Technology website at:

http://tig.kstc.com/
http://ksef.kstc.com/index.htm
http://www.kyepscor.org/ky_epscor_programs.htm

Findings

- R&D and commercialization are long-term endeavors, which will require new investment funds, a deep pool of knowledgeable workers, and an entrepreneurial climate.

- New issues, including intellectual property rights and public policy implications of some kinds of research, will emerge as the knowledge-based economy programs are implemented, and future amendments to the Kentucky Innovation Act of 2000 may be necessary.

- To ensure the greatest return on state dollars invested, the Council must develop dynamic, strategic connections between postsecondary education, workforce, welfare, and economic development to promote postsecondary access and success; to align postsecondary education with current and emerging needs of business and industry; to promote participation of women and minorities; to open dialog to understand and respond to students' needs and expectations as they prepare for employment and business creation; and to nurture an entrepreneurial climate and culture.

Recommendation

- Secure funding for a fourth round of the Endowment Match Program (Bucks for Brains) and maintain the existing funding for the Commercialization Investment Programs, Innovation and Commercialization Centers, and Office for the New Economy programs [see Glossary].

Proposed Program Guideline Changes

- Amend the Council's guidelines and add the stipulation that a company that moves outside of the state within a specified period of time after receiving an award is subject to a penalty and must repay its award.

- Amend the Council's guidelines to allow a qualified company to comply with the legislative definition of the Kentucky-based qualification criteria through

contractual language. The Kentucky-based stipulation is expensive for an applicant and burdensome to regulate. By changing it to a contractual requirement and adding a penalty for moving, the Council can accomplish the same result, keeping growing companies in Kentucky.

- Amend the Council's guidelines to allow a company to receive multiple awards if its projects are distinct.

II. Glossary

Commercialization Investment Programs

CIP, Commercialization Investment Programs, provide funding for the Research and Development Program, Rural Innovation Program, and Commercialization Fund, all established in the Kentucky Innovation Act, HB 572, 2000 Regular Session.

EPSCoR, the Experimental Program to Stimulate Competitive Research

EPSCoR, the National Science Foundation (NSF) initiated the Experimental Program to Stimulate Competitive Research in 1979 as a unique infrastructure-building effort to encourage local action to develop long term improvements in a state's science and engineering enterprise. It was created in response to Congressional concerns about geographical concentration of federally funded academic research and development.

Nineteen states and Puerto Rico have been designated as EPSCoR states. Through these federal-state partnerships, EPSCoR focuses on science, engineering, and technology capabilities that promote national competitiveness. These partnerships help to balance federal research dollar distribution and use state or local control to deliver program goals.

NSF EPSCoR success in the 1980s led Congress to expand the NSF program in the 1990s and create EPSCoR-related programs in the Department of Energy (DOE), Department of Defense (DoD), Department of Agriculture (USDA), Environmental Protection Agency (EPA), National Aeronautics and Space Administration (NASA), and the National Institutes of Health (NIH).

All agencies have research competitiveness as a cornerstone upon which states are to develop strategies leading to future national prominence. Each EPSCoR state designs and executes its own strategic plans by melding exemplary research, education, and economic development initiatives into a statewide approach. EPSCoR is a catalyst of change that is widely viewed as a model federal-state partnership.

The Kentucky Statewide EPSCoR Committee operates as a quasi-independent committee of the Kentucky Science and Technology Corporation. Its purpose is to stimulate and enhance competitive research, to stimulate and effect systemic and sustainable improvement in the capacities of the state's universities and colleges to compete successfully for research and development funds on a national basis, and to stimulate complementary cooperative efforts in education and human research development to ensure growth and support of science, engineering, and mathematics research and training.

Dr. Rick Kurzynske is Director of the Kentucky EPSCoR program and Dr. Wimberly Royster is the Kentucky EPSCoR Chair. The Statewide Committee is composed of nineteen members with statewide representation. Members include six university administrators, seven faculty researchers, and six private/public representatives. The

university administrators must have experience in basic science and engineering supported by federal agency EPSCoR programs. The faculty members must have well-established records of winning external funding in basic science and engineering supported by federal agency EPSCoR programs. The private/public sector representatives must have backgrounds in science and/or engineering. All members of the Statewide EPSCoR Committee are expected to have an understanding of current science policy and related areas.

Members of the Statewide EPSCoR Committee are:

Ms. Judi Streepey, Vice Chair;
Mr. Richard Alloo, General Manager, Toyota Motor Manufacturing North American, Inc.;
Dr. Wendy Baldwin, Vice President for Research, University of Kentucky;
Dr. Del Collins, Associate Vice President for Research, University of Kentucky;
Dr. David Cohn, Department of Biological & Biophysical Sciences, School of Dentistry, University of Louisville;
Dr. Blaine Ferrell, Dean, Ogden College of Science, Health & Technology, Western Kentucky University;
Dr. Eric Grulke, Advanced Carbon Materials Center, University of Kentucky;
Dr. Rick Kurzynske, Lexington, Kentucky, *ex officio*;
Dr. T.S. Kochhar, Department of Biology, Kentucky State University;
Dr. John Mateja, Director, Undergraduate Research and Scholarly Activities, Murray State University;
Dr. Nancy Martin, Vice President of Research, University of Louisville;
Dr. Rogers Redding, Vice President for Academic Affairs and Provost, Northern Kentucky University;
Dr. Bob Stout, Chairman, Dept of Microbiology, University of Louisville;
Mr. Ken Tuggle, Frost, Brown, Todd LLC, Louisville, Kentucky; and
Dr. David White, Center for Reservoir Research, Murray State University.

EPSCoR Subcommittee Chairs are:

Dr. Richard Hackney, Chair, NASA EPSCoR Program, Department of Physics & Astronomy, Western Kentucky University;
Dr. Darrell Chenoweth, Chair, DOD EPSCoR Program, Department of Electrical Engineering, University of Louisville;
Dr. John Connolly, Chair, NSF EPSCoR, University of Kentucky;
Dr. John Stencel, Chair, DOE EPSCoR Center for Applied Energy Research, University of Kentucky; and
Dr. David White, Chair, EPA EPSCoR, Hancock Biological Station, Murray State University.

House Bill 525, 2002 Regular Session

House Bill 525, 2002 Regular Session, amended HB 572 to create more meaningful tax incentives for knowledge-based business development. HB 525 also changed organization of certain programs created by HB 572 (see Regional Technology Corporations)

House Bill 572, the Kentucky Innovation Act, 2000 Regular Session

House Bill 572, the Kentucky Innovation Act, 2000 Regular Session, launched Kentucky's knowledge-based economy initiatives. The Act was based on concepts developed at the request of Governor Paul Patton and published in Kentucky's Science and Technology Strategy in 1999. Knowledge-based programs are housed in the Council on Postsecondary Education and the Cabinet for Economic Development.

The legislation outlined a vision of a strong, entrepreneurial economy in Kentucky, characterized by knowledge, innovation, and speed. Provisions were geared to support economic development in both urban and rural areas of Kentucky, create research and development support programs, provide manufacturing modernization services, and provide the necessary fiscal stimulus to create, attract, incubate, and grow high-tech firms.

ICC, Innovation & Commercialization Centers

ICC, Innovation & Commercialization Centers are funded by the Cabinet for Economic Development's Office of the New Economy. The ICC network is composed of six offices throughout the state with the mandate to increase high quality technology deal flow.

The ICC network will help scientists and entrepreneurs define and perfect their ideas and fund or license new and innovative technologies. The process is built around industry standards of business concepts and valuations of companies, and idea presentation to potential investors. The ICC works through its six regional offices to coordinate local efforts to aggregate investors, service providers, and resources so that ideas and capital can connect throughout the Commonwealth. ICC offices are located at Eastern Kentucky University, Murray State University, Northern Kentucky University, University of Louisville, and Western Kentucky University.

KBE Workgroup, the Knowledge-based Economy Advisory Workgroup

KBE Workgroup, a Knowledge-based Economy Advisory Workgroup was formed in 1999 to draft HB 572 and has continued to meet regularly. Members of the KBE Workgroup represent the Council, the Office for the New Economy, the Cabinet for Economic Development, the Governor's Office for Policy and Management, the Legislative Research Commission, and the Finance and Administration Cabinet. The Workgroup facilitates implementation of the Act, resolves issues not anticipated when the

legislation was drafted, maintains communication between cabinets and agencies as programs come on line, and identified the amendments ultimately adopted in HB 525.

KIC, the Kentucky Innovation Commission

KIC, Kentucky Innovation Commission, was established in HB 572, 2000 Regular Session. Commission membership consists of the Governor, the secretary of the Governor's Executive Cabinet, the secretary of the Cabinet for Economic Development, the president of the Council, the state budget director, the Speaker of the House, the President of the Senate, and eight at-large members appointed by the Governor. Four of the appointed members must be from the private sector and possess extensive experience and expertise in managing high-technology business or are engaged in an innovation-driven, knowledge-based enterprise; one member is engaged in the business of venture capital; one member represents the private sector and possesses extensive experience and expertise in providing or supporting communications infrastructure; and two members either are engineers or scientists recognized for their scientific or technological research efforts, or educators with an interest or background in teaching students to become highly skilled workers or entrepreneurs.

The current at-large members are:

- Engineer/scientist or educator teaching highly skilled workers:
  Dr. Nancy Martin (Louisville), Vice President for Research, Full Professor, and holder of the Preston Pope Joyes Endowed Chair in Biochemical Research, University of Louisville; and
  Dr. Ken Roberts (Lexington), Dean, University of Kentucky College of Pharmacy;

- Experience in venture capital:
  Craig Greenberg (Louisville), Of Counsel, Frost Brown Todd LLC;

- Experience and expertise relating to providing and supporting communications infrastructure:
  E.C. (Eddy) Roberts, Jr. (Louisville), State President, Bell South Kentucky;

- High-tech experience:
  Henry Jackson, President, Screw Machine Technologies, Inc., Georgetown, Kentucky;
  Dean Hughes, Project Engineer, Community Telephone, Inc., Paducah, Kentucky;
  Charleen Combs, co-founder and President , Data Futures, Inc., Harlan, Kentucky; and
  Rich Hempel, President and CEO, A.F. Kelly, Covington, Kentucky.

KSEF, the Kentucky Science and Engineering Foundation

KSEF, the Kentucky Science and Engineering Foundation was created in HB 572, 2000 Regular Session, to build science and engineering capacity and excellence by investing in exploratory advanced research, purpose-driven research, research in emerging technologies and ideas, human resource development, and technological innovations in Kentucky. KSEF structure and goals have been modeled after the National Science Foundation.

The Kentucky Science and Technology Corporation operates the Foundation through a contract with the Council.

The KSEF Advisory Board members are:

- the University of Kentucky (Dr. Wendy Baldwin) and the University of Louisville (Dr. Nancy Martin) Research Vice Presidents,
- two EPSCoR members from the comprehensive universities (Dr. Blaine Ferrell, Western Kentucky University, and Dr. Tejinder Kochhar, Kentucky State University),
- one member from the independent colleges or universities (Dr. James Miller, Transylvania),
- three corporate representative (Roger Dingus, UPS, Ed McInerney, General Electric, John Zbrozek, Lexmark International),
- and three members with science and engineering connections outside Kentucky (Dr. Charles Kupchella, University of North Dakota, Dr. Charles Wyman, Dartmouth College, and Dr. Jennie Hunter-Cevera, University of Maryland, Biotechnology Institute).

KSTC, the Kentucky Science and Technology Corporation

KSTC, the Kentucky Science and Technology Corporation, is a nonprofit organization founded in 1987 to enhance the capacity of Kentucky citizens, firms, and organizations to use science and technology and effectively compete in the global marketplace.

KSTC is committed to the advancement of science, technology, and innovative economic development founded on Kentucky know-how. KSTC develops and manages initiatives in education, economic competitiveness, and scientific research and is governed by a board of directors comprised of leaders from business, education, and government.

KSTC board members are:

Chair, J. Ronald Geoghegan, BellSouth Tele-communications, Frankfort;
Vice Chair, Shiela S. Medina, East Kentucky Power Cooperative, Winchester;
Secretary/Treasurer, Sam P. Burchett, Lexington;
Sam S. Anzelmo, Anzelmo & Associates, Inc., Lebanon;
Terry E. Beeler, ALLTEL Communications, Lexington;
Charles H. Bennett, Kentucky State University, Frankfort;
Gary Braswell, MPD Inc., Owensboro;
Douglas F. Cobb, Appriss Inc., Louisville;
Delwood C. Collins, University of Kentucky Medical Center, Lexington;
Charleen Combs, Data Futures Inc., Harlan;
Gary S. Cox, AIKCU, Frankfort;
Alex Day, Sheltowee, LLC, Louisville;
Gerald L. DeMoss, Morehead State University;
Linda P. France, Jessamine County Schools, Nicholasville;
Arnold Gaither, LFUCG Mayor's Training Center, Lexington;
Willis Johnson, University of Kentucky, Lexington;
James Jones, Mason Hanger Corporation, Lexington;
Mark Kristy, Pricewaterhouse Coopers LLP, Louisville;
J. Dan Lacy, Ashland Inc., Covington;
William M. Lear, Stoll Keenon & Park LLP, Lexington;
Brack Marquette, Verizon, Lexington;
Mike Marsden, Eastern Kentucky University, Richmond;
Nancy C. Martin, University of Louisville, Louisville;
John Mateja, Murray State University, Murray;
John C. Merchant, Peck, Shaffer & Williams LLP, Cincinnati;
Gary Mielcarek, United Parcel Service, Louisville;
Katherine G. Peden, Katherine G. Peden and Associates, Inc., Louisville;
Raymond M. Schreck, Louisville;
James C. Seiffert, Stites & Harbison, Louisville;
David Szetela, Louisville;
Lee T. Todd, University of Kentucky, Lexington;
Roy Vasher, Toyota Motor Mfg of KY, Erlanger;
Laura Wilson Voss, Lexmark International, Inc., Lexington;
James C. Votruba, Northern Kentucky University, Highland Heights;
Susan Weiss, NetTango, Louisville; and
Lynn A. Witten, KMAC (KY Manufacturing Assistance Center), Lexington.

ONE, the Office of the New Economy

ONE, HB 572, 2000 Regular Session, established the Office of the New Economy in the Cabinet for Economic Development. Its mission is to lead the statewide initiative to spur the growth of the knowledge-based economy in Kentucky. The 2000 Kentucky General Assembly charged the ONE with developing a statewide strategic plan for the economy that defines goals, sets priorities, and charts a strategy for success. It also identifies

performance indicators by which to measure progress made by Kentucky over the next decade.

RTC, the Regional Technology Corporations

Regional Technology Corporations were created in House Bill 572, 2000 Regular Session, to act as intermediary organizations delivering services and providing resources to knowledge-based clusters, primarily in rural areas of Kentucky. Public and private organizations, including comprehensive universities and other postsecondary institutions, could participate in activities organized by the RTCs.

The RTCs were to identify key areas in which the state has comparative advantages, identify the key supplier chains involved, recommend ways to link key suppliers and industry anchors to other industries in a matchmaking function, work with economic development recruitment organizations, and assist in identifying and encouraging companies to fill gaps in supplier chains or serve as anchors for cluster development. They were to serve as regional one-stop clearinghouses to cluster companies and related organizations, identify and support the creation of curricula, short courses, certificate programs, and non-degree programs to meet the workforce training needs of promising industries and clusters, support existing industry associations and help create new associations in emerging industries and clusters. RTCs were to develop regional strategies around their purpose and advocate for and secure public and private resources to implement these strategies.

The section of House Bill 572 that created the RTCs was repealed and the RTCs were recreated as ICC satellites in House Bill 525, 2002 Regular Session. The satellites will serve the same function as originally intended for the RTCs but will be attached to the ONE instead of the Council.

Research Priority Areas

Research Priority Areas are targeted research areas where the Commonwealth's resources are being focused and Kentucky stands to gain national prominence.

The Office for the New Economy, scholars, and scientific experts across the Commonwealth identified five research priority focus areas for Kentucky. The priority areas are based on an inventory of currently funded research at the University of Kentucky and the University of Louisville and complementary applied research activity at the comprehensive universities. The field was narrowed after analysis of research talent, federal funding potential, the probability that Kentucky could gain national prominence in the field, and whether the research area could yield significant technology transfer and commercialization opportunities.

Kentucky's research priority areas are: human health and development, biosciences, information technology and communications, environmental and energy technologies, and materials science and advanced manufacturing.

These research priority areas will afford Kentucky the best opportunity to build centers of research excellence around which competitive technology-based clusters can grow and thrive. These centers and associated business clusters will have the greatest influence on the creation of the knowledge-based economy in Kentucky.

III. Introduction and History

The Kentucky Innovation Act, House Bill 572, 2000 Regular Session, assigned to the Council oversight of four initiatives to stimulate research and development, university-business collaboration, and rural involvement in high-technology growth: the Research and Development Voucher Program, the Commercialization Fund, the Rural Innovation Program, and the Regional Technology Corporations. The section of the Act that created the RTCs was repealed in the 2002 regular session and the RTCs were recreated as satellites to Innovation and Commercialization Centers, managed by the Cabinet for Economic Development's Office for the New Economy.

The Act also designated the Council as the fiscal agent for the Kentucky Science and Engineering Foundation and the Kentucky Experimental Program to Stimulate Competitive Research.

The Council contracted with the Kentucky Science and Technology Corporation to administer the commercialization investment programs. KSTC publishes requests for proposals for each of the programs, receives and reviews applications, and selects grant recipients based on the criteria approved by the Council (www.cpe.state.ky.us/council/council_073001.asp).

The Act also directed the Commissioner for the New Economy to develop a statewide strategic plan for the knowledge economy (www.one-ky.com/plan.html). This plan recognizes Kentucky's current position in the knowledge-based economy, identifies knowledge-based economy niches where Kentucky might gain a competitive edge, and establishes the public policy framework necessary to achieve results.

House Bill 525, 2002 Regular Session, calls for the Council on Postsecondary Education to submit an annual report to the Kentucky Innovation Commission, the Governor, and the General Assembly prior to October 15. The report is to detail the Council's work related to the Science and Technology Programs created in KRS 164.6021 (R&D Voucher Program), 164.5029 (Commercialization Fund), 164.6037 (Rural Innovation Program), and 143.12.320 (Kentucky Science and Engineering Foundation). The report is to include progress made in achieving each program's purposes, qualitative and quantitative information concerning the applications received, projects approved and undertaken, companies served, funding amounts invested in each project or program, and findings and recommendations to increase each program's effectiveness.

IV. Commercialization Investment Programs

The Innovation Act, HB 572, 2000 Regular Session, created three programs to fund research and development and research commercialization: the R&D Voucher Program, the Rural Innovation Program, and the Commercialization Program. Table 1 shows the FY 2002-03 balance sheet for these three programs.

Minorities, including women and the economically disadvantaged, received $222,200 in Commercialization Investment Program awards in FY 2002-03, comprising less than 10% of the total amount of funds committed.

The Kentucky Science and Engineering Foundation also was created to invest in applied research to develop emerging technologies. In addition, the Experimental Program to Stimulate Competitive Research, a federal grant program, contributes to applied research in Kentucky. Balance sheets for these two programs are on pages 27 and 35.

Table 2. KSTC Commercialization Investment Programs
FY July 1, 2002 to June 30, 2003

Program	*2003 General Fund Appropriation*	*Admin Costs*	*Awards*	*Balance*
Early Concept	200,000	4,706	99,912	95,382
R&D Voucher	2,800,000	146,956	500,000	2,153,044
Rural Innovation	1,000,000	101,880	276,000	622,120
Commercialization	750,000	76,218	149,999	523,783
*Regional Technology Corporations (RTC)	500,000	0	0	0

*The RTC program was established in 2000 and repealed and recreated as Innovation and Commercialization Centers in 2002. The appropriation was transferred to the Office of the New Economy.

A. R&D Voucher Program
$3 million, FY 2002-03

The R&D Voucher Program is a $3 million investment fund that enables small and medium-sized Kentucky-based firms to undertake research and development in partnership with Kentucky university researchers. Investments are made in technology refinement, prototype development, and commercial product development. Eligible applicants may receive up to $200,000 over two years, not to exceed $100,000 in any one year.

The Early Concept Pool is a set aside within the R&D Voucher Fund. It is available to provide initial funds to emerging companies, products, or technologies.

During fiscal year 2002-03, five R&D Voucher projects were funded, for a total of $500,000, and four Early Concept projects were awarded, totaling $99,912.

1. Program Goals

The program goal is to expand knowledge-driven R&D capacity in Kentucky by investing in innovation and public/private partnerships that lead to new or valued-added companies, jobs, technology, products, processes or services.

Small and medium-sized Kentucky-based companies that seek to undertake research and development work in partnership with universities in the Commonwealth.

2. Investment Guidelines

Project funding in the Kentucky R&D Voucher Fund Program has the following limitations:

1. Voucher award funds from the state fund are expended within the university under contract. At least 51% must be spent at the university.
2. The maximum amount of funding is $200,000 over 2 years not to exceed $100,000 per year.
3. At a minimum, the qualified company must match the project award by a one-to-one dollar ratio, with a minimum $25,000 in cash match, for each year of the project.
4. All awards are subject to repayment stipulations.

3. Matching

Companies must match the fund's investment on a one-to-one dollar ratio, with at least $25,000 of the match in cash. The remaining match can come from in-kind sources. Universities are able to provide matching dollars and services in addition to the investment amount awarded. Matching in-kind dollars from universities requires a budget to account for dollars being paid in versus in-kind services. In-kind services cannot be comprised of state investment dollars. No funds that have been generated through any state source may be used as matching funds.

4. Investment Preconditions

Prior to being certified for investment funding, the qualified company must:

- Negotiate an agreement and funding contract with a university in the Commonwealth to undertake the research and development work; and
- Provide assurance that the university and the qualified company have negotiated the ownership and disposition of patents, royalties, all other intellectual property rights, and equity or related position between the qualifying company and the university as it relates to the contract.

- Prior to certifying a qualified company, ownership and disposition of patents, royalties, all other intellectual property rights, and an equity or related position may be negotiated on behalf of the Kentucky R&D Voucher Fund for the sole purpose of reinvesting and sustaining a revolving fund to carry out the related provisions of the Kentucky Innovation Act.
- Only one award per company per annual funding cycle may be funded.

5. 2002-03 Awards

Table 3. Five R&D Voucher projects funded in 2002-03, total $500,000

Organization/ Affiliate (Location)	*County*	*Applicant*	*Project Description*	*Research Priority Area*	*Award*
High Tide Technologies (Bowling Green) University Partner - Western Kentucky University	Warren	Joe Ahler	Develop a proprietary sanitary sewer overflow monitoring system, which will wirelessly transmit flow, level, and rainfall information to customers.	Information Technology & Communications	$100,000
Novera, LLC (Louisville) University Partner - University of Louisville	Jefferson	Patrick Migliore	Preclinical research to determine optional formulation and delivery schedule for accelerating healing rates of all types of wounds	Human Health & Development	$100,000
PlanGraphics, Inc. (Frankfort) University Partner - Murray State University	Franklin	John Antenucci	Design, field test and market value-added commercial data products from high resolution commercial satellite imagery	Information Technology & Communications	$100,000
U.S. WorldMed (Louisville) University Partner - University of Kentucky	Jefferson	Breck Jones	US WorldMeds proposes to develop and commercialize proprietary pharmaceutical products.	Human Health & Development	$100,000
Yaupon Therapeutics, LLC (Lexington) University Partner - University of Kentucky	Fayette	Robert Alonso	Skin delivery technology for S-(-) nornicotine in the treatment of nicotine dependence	Biosciences	$100,000

6. Spotlight

- High Tide Technologies, through its partner, The Center for Water Resource Studies at Western Kentucky University, will use this funding to complete research and development on a proprietary sanitary sewer overflow monitoring system, which will wirelessly transmit flow, level, and rainfall information to customers. This market is being driven by recent regulations promulgated by the

U.S.E.P.A. to control and eliminate sanitary sewer overflows caused by rainfall infiltration and inflow into municipal sewer systems;

B. Early Concept Pool $200,000, FY 2002-03

The Early Concept Pool was set aside from the R&D Voucher Fund in 2002. It is available to provide initial funds to emerging companies, products, or technologies.

1. Purpose and Guidelines

The purpose of the Early Concept Pool is to assist individuals and businesses in the earliest stages of project feasibility and concept development. An applicant must be a Kentucky-based company with fewer than 150 employees. Funded companies retain ownership of the technology. The maximum amount of funding for a project is a one-time award of $25,000 and the company must match the fund's investment on a one-to-one dollar ratio. No repayment is requirement.

2. 2002-03 Awards

Table 4. Four Early Concept projects were awarded in 2002-03, for a total of $99,912.

Organization/ Affiliate (Location)	*County*	*Applicant*	*Project Description*	*Research Priority Area*	*Award*
Global Project Design (Covington)	Kenton	Brian Moser	GPD is developing a web based portal for their software that is used in the design, analysis, and improvements of project management.	Information Technology & Communications	$25,000
NanoMed Pharmaceuticals (Lexington)	Fayette	Steven Benoit	Pharmaceuticals company developing novel nanoparticle-based CNS drug and vaccine delivery systems to deliver drugs to the brain and to create "next generation" vaccines.	Biosciences	$24,912
PeopleStrategy LLC (Covington)	Kenton	Victor Agruso	Web based software application that automates and streamlines people administration transactions for greater efficiency, compliance, and employee satisfaction.	Information Technology & Communications	$25,000
Software Information Systems (SIS) (Lexington)	Fayette	Bart van Dissel	Software Information System (SIS) is developing a new product, Visual Business Suite (VBS), business intelligence/ accounting software for value added resellers (VARs).	Information Technology & Communications	$25,000

C. Rural Innovation Program, Level 1 and Level 2 $1 million, FY 2002-03

The Rural Innovation program is a $1 million investment fund that assists small, rural, Kentucky-based firms in undertaking research and development. Funds must be used in

partnership with a university or a private sector third party. Investments are made in proof of concept development and early stage prototyping.

Pursuant to guidelines adopted by the Council, an applicant eligible for Level 1 funding may receive up to $7500 in the form of a grant. An applicant eligible for Level 2 funding may receive up to $100,000 over two years, not to exceed $50,000 in either year. Awards under $25,000 are considered grants; awards over $25,000 may be subject to repayment.

Twenty-nine Rural Level 1 projects were awarded in 2002-03, for a total of $172,500. Three Rural Level 2 projects were awarded for a total of $103,500. Rural Innovation awards totaled $276,000.

1. Purpose

Pursuant to guidelines adopted by the Council, the purpose of the Level 1 Rural Innovation Fund is to provide pre-seed (pre-angel investment) money to small and medium sized rural Kentucky businesses that are seeking to commercialize a technology, process, or product.

An appropriate company applicant is one that has a product with patentable technology and a clear market. Specifically, the applicant should have a product that is innovative and new or improved technology that will drive the economy. Infrastructure funding is not included.

2. Award Amount, Level 1

The maximum of funding available for a Level 1 award is $7500.

This award is available only one time to each company that qualifies. To compete for these funds, the applicant must complete a formal application by the deadline date.

Past company expenses are not reimbursed but work that is agreed upon for a specific project will be funded. Expenses incurred before written approval are not reimbursed.

3. Eligibility Requirements

- The company must be located in rural Kentucky. Rural is defined as any county other than Fayette, Jefferson, Campbell, Kenton, and Boone counties.
- The company must have less than 50 employees.
- All funds must be spent with a third party on behalf of the company. The company can hire a consultant, a university partner, or a service provider. The money cannot be used to pay company salaries or overhead.
- If the company is contracting with a university, the agreement with the university regarding licensing or acquisition of intellectual property must be in place prior to applying and is subject to review.

- The company must be able to demonstrate a clear potential of its product, service, or process to lead to commercial success.

4. 2002-03 Awards

Table 5. Twenty-Nine Rural Level 1 awards granted in 2002-03, total $172,500.

Company	*Location*	*Applicant*	*Project Description*	*Research Priority Area*	*Award*
A&E Compliance International LLC	Warren	W. Edward McCracken	Business plan and marketing strategy for environmental start-up.	Environmental & Energy Technologies	$7,500
Advanced Nuclear Technologies (Bowling Green)	Warren	Phillip Womble	Advanced Nuclear Technology, Inc. (ANT) is developing the next generation mineral analysis for quality control in mineral processing applications for cement production facilities.	Materials Science & Advanced Manufacturing	$7,500
Anavasis (Russellville)	Logan	Paul Whitley	Business plan development for Anavasis Pharmaceuticals, a startup pharmaceutical contracts research and development company.	Biosciences	$7,500
Ballad Enterprises, Inc. (Bowling Green)	Warren	Terry Tatum	Medical device for organizing specimens from multi-biopsy procedures.	Biosciences	$7,500
Boyce Gray and Associates (Brownsville)	Edmonson	Boyce Gray	This funding will be used to develop a commercialization strategy and to perform a patent search and filing of a provisional patent.	Materials Science & Advanced Manufacturing	$7,500
Byrd & Associates (Bowling Green)	Warren	Jim Byrd	Jim Byrd and Associates will use this funding to pursue patent protection relating to a simple and cost-effective mechanical device used to assist the moving of furniture.	Materials Science & Advanced Manufacturing	$7,500
CAMM Enterprises	Pike	Martin Fortier	Funds will be used to develop a feasability plan for innovative shrimp and tilapia production.	Environmental & Energy Technologies	$7,500
CIF-202	Simpson	*Confidential	*Confidential	Environmental & Energy Technologies	$7,500
Design Technology (Kuttawa)	Lyon	Dick Bowman	US patent search and formal application for innovative woodworking commercial automation system	Materials Science & Advanced Manufacturing	$7,500
CIF-202	Simpson	*Confidential	*Confidential	Environmental & Energy Technologies	$7,500
Design Technology (Kuttawa)	Lyon	Dick Bowman	US patent search and formal application for innovative woodworking commercial automation system	Materials Science & Advanced Manufacturing	$7,500
Digital Connections, Inc. (Paducah)	McCracken	John Davis	Add graphical elements to a current software product to enhance value.	Information Technology & Communications	$7,500
Electrokelan Mfg. Col, Inc. (Kite)	Knott	James Collins	Business plan to explore a new market for backpack vacuums in the equine industry.	Materials Science & Advanced Manufacturing	$7,500

Company	Location	Applicant	Project Description	Research Priority Area	Award
EnTerActive Networks, Inc. (Carrollton)	Carroll	Marc Clark	ETA has developed a unique advertising network that allows merchants to send custom offerings to their patrons via mobile phone technologies using SMS Messaging services.	Information Technology & Communications	$7,500
Global Technology Services, Inc. (Paintsville)	Johnson	David Trimble	Business plan development focused around their patented process and software tool, the Computerized Training Management System.	Information Technology & Communications	$7,500
Harris Systems (Ashland)	Boyd	Danny Harris	Harris systems has designed and built a prototype that can automatically self-align and adjust motor shafts of industrial electric motors that are coupled with direct-drive rotating machinery.	Materials Science & Advanced Manufacturing	$7,500
Imaginary Industries, Inc. (Versailles)	Woodford	Mark Miller	Intellectual Property (IP) protection of for a proprietary device used in the equine medical market	Materials Science & Advanced Manufacturing	$7,500
LawReader, Inc. (Carrollton)	Carroll	Gwen Billingsley	LawReader is a web portal providing legal research resources targeted to the legal profession.	Information Technology & Communications	$7,500
Prime Leads Corporation (Berea)	Madison	Paul Ransdell	Business and product development for a proprietary process of matching prospective students and postsecondary education institution	Information Technology & Communications	$7,500
RAMM, LLC (Paris)	Bourbon	Anthony McEldowney	Working with the University of Kentucky to develop a patented computer regulated medicine dispenser.	Human Health & Development	$7,500
CIF-201	Butler	*Confidential	*Confidential	Materials Science & Advanced Manufacturing	$7,500
CIF-222	Morgan	*Confidential	*Confidential	Materials Science & Advanced Manufacturing	$7,500
CIF-204	Powell	*Confidential	*Confidential	Materials Science & Advanced Manufacturing	$7,500
Servant, Inc. (Cunningham)	Carlisle	Kevin Davis	Business plan development for a web service to support county businesses and organizations	Information Technology & Communications	$7,500
Staples Environmental & Industrial Hygiene (Versailles)	Woodford	Joey Staples	These funds will be used to develop a business plan for Staples Environmental & Industrial Hygiene Services.	Environmental & Energy Technologies	$7,500
High Tide Technologies (Bowling Green) University Partner - Western Kentucky University	Warren	Joe Ahler	Develop a proprietary sanitary sewer overflow monitoring system, which will wirelessly transmit flow, level, and rainfall information to customers.	Information Technology & Communications	$100,000
Novera, LLC (Louisville) University Partner - University of Louisville	Jefferson	Patrick Migliore	Preclinical research to determine optional formulation and delivery schedule for accelerating healing rates of all types of wounds	Human Health & Development	$100,000
PlanGraphics, Inc. (Frankfort) University Partner - Murray State University	Franklin	John Antenucci	Design, field test and market value-added commercial data products from high resolution commercial satellite imagery	Information Technology & Communications	$100,000

Company	Location	Applicant	Project Description	Research Priority Area	Award
U.S. WorldMed (Louisville) University Partner - University of Kentucky	Jefferson	Breck Jones	US WorldMeds proposes to develop and commercialize proprietary pharmaceutical products.	Human Health & Development	$100,000
Yaupon Therapeutics, LLC (Lexington) University Partner - University of Kentucky	Fayette	Robert Alonso	Skin delivery technology for S-nornicotine in the treatment of nicotine dependence	Biosciences	$100,000

* Information is confidential until awardee has submitted a final business plan and negotiated required agreements.

5. Spotlight

- Design Technology (Kuttawa, Lyon County) developed an innovative woodworking commercial automation system applicable to a wide range of industrial and commercial automation. Simple direct commands cause exact location changes for precision machine operation;

- Global Technology Services (Paintsville, Johnson County) modified and enhanced the Computerized Training Management System (CTMS), a patented process and software tool, and use it to train and qualify rural utilities' staff and homeland security response teams responsible for preventing and combating biological and chemical weapons in water systems.

6. Award Amount, Level 2

The maximum funding available for a Level 2 award is $100,000 over two years, not to exceed $50,000 in any give year (totals include prior Rural Level 1 investments).

Awards under $25,000 are considered grants and are not subject to repayment stipulations.

Awards over $25,000 are not grants and are subject to repayment stipulations. Either the applicant is expected to pay the money back, or an equity stake in the company will be taken. If the company is unable to generate revenue, repayment is not forced.

Only one award per company per funding cycle may be funded.

7. Eligibility Requirements

- The company must be located in rural Kentucky. Rural is defined as any county outside of Fayette, Jefferson, Campbell, Kenton, and Boone counties.
- The company must have less than 100 employees.
- All funds must be contracted to a third party. The company can hire a consultant, a university partner, or a service provider. The money cannot be used to pay company salaries or overhead.

- If the company contracts with a university, the agreement with the university regarding licensing or acquisition of intellectual property must be in place prior to applying and is subject to review.
- The applicant must have an invention that is new or improved and is commercially viable. The invention may be a process, a technology, or an actual product but in any case it must be able to be protected as intellectual property and to have market potential.
- The applicant must demonstrate a clear potential of its product, service, or process to lead to commercial success.
- The applicant must have a business plan that meets application standards. If there is no business plan, the applicant may apply for a Rural Level 1 award and use up to $7500 to contract with a third party for business plan development.
- The application and review process was developed along the lines of private venture capital processes for analyzing and evaluating investment opportunities.

8. 2002-03 Awards

Table 6. Three Rural Level 2 awards granted in 2002-03, total $103,500

Company	*Location*	*Applicant*	*Project Description*	*Research Priority Area*	*Award*
Buswell Energy, LLC (Berea) RUR2 (previously received RUR1 award)	Madison	Harrie Buswell	Prototype testing of proprietary transformer technology.	Environmental & Energy Technologies	$42,500
ChemClark (Ford) RUR2 (previously received a RUR1 award)	Clark	Heinz Kohler	Validation of antibody cross-linker for therapeutic purposes	Biosciences	$18,500
Nebecor (Clay City) RUR2 (previously received a RUR1 award)	Powell	Terry Hunsucker	Business plan development for a company who has designed a new crankshaft	Materials Science & Advanced Manufacturing	$42,500

D. Commercialization Program $750,000, FY 2002-03

The Commercialization fund has $750,000 to invest in university faculty to translate their research into marketable products. Kentucky university researchers, as the eligible applicants, may receive up to $225,000 per project over three years, not to exceed $75,000 in any one year.

Two projects were funded in 2002-03, for a total of $149,999.

1. Purpose

The purpose of the Kentucky Commercialization fund is to help commercialize a process, product, or invention that is created or improved at an accredited university or college in the Commonwealth. The applicant must be a faculty member at such an institution to

apply. The goal is that faculty will be able to license their technology or start a company following this investment.

A successful application is one that develops a prototype to commercialize the technology.

2. Eligibility

The applicant must be a faculty member at a postsecondary institution in Kentucky. The project must focus on commercialization of a technology that could be protected as intellectual property.

3. Investment Preconditions

Prior to final funding approval, the university submitting the proposal provides assurance that the collaborating parties have addressed the ownership and disposition of patents, royalties, all other intellectual property rights, and an equity or related position between the qualifying company and a partnering entity as it relates to the contract.

Prior to funding approval, ownership and disposition of patents, royalties, all other intellectual property rights, and an equity or related position may be negotiated on behalf of the Kentucky Commercialization Program for the sole purpose of reinvesting and sustaining a revolving fund to carry out the provisions of the fund.

Project funding in the Kentucky Commercialization Program has the following limitations:

1. The maximum amount of funding for a project is $225,000 over three years not to exceed $75,000 per year.
2. The University of Kentucky and the University of Louisville may be awarded together no more than seventy percent (70%) of fund awards per funding cycle.
3. Awards are subject to a royalty repayment agreement with the university.

4. 2002-03 Awards

Table 7. Two Commercialization projects funded in 2002-03, total $149,999.

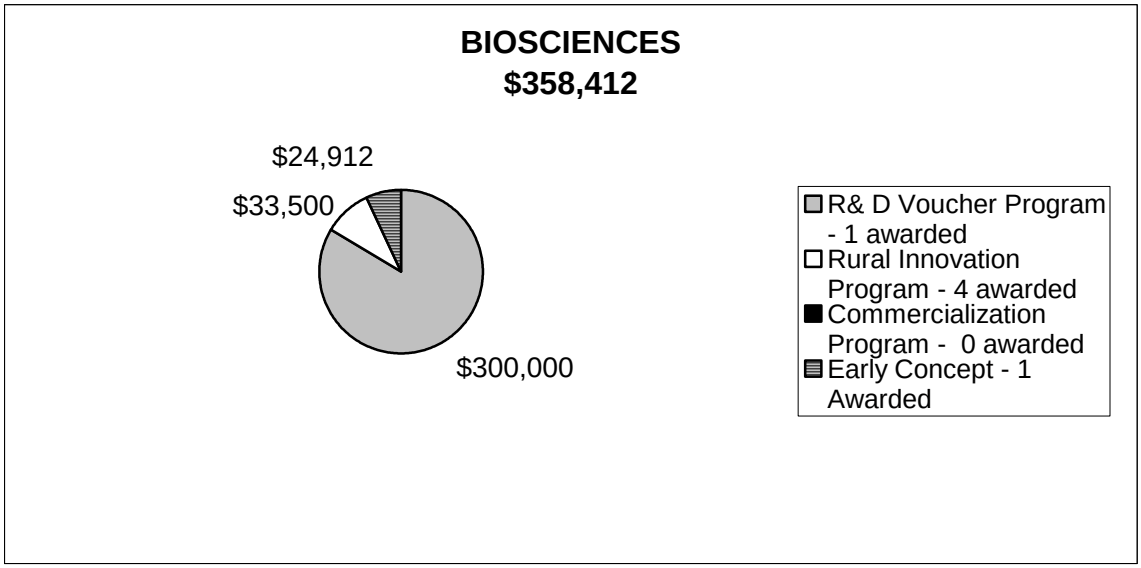
University	*Location*	*Applicant*	*Project Description*	*Research Priority Area*	*Award*
University of Kentucky	Fayette	Daniel Tao	Researchers at UK are working on a technology aimed at developing an innovative next-generation tribo-electrostatic separation technique for particulate materials.	Materials Science & Advanced Manufacturing	$74,999
Western Kentucky University	Warren	Chris Byrne	Researchers at WKU will focus on the development of a new class of materials derived from natural precursors such as wood.	Materials Science & Advanced Manufacturing	$75,000

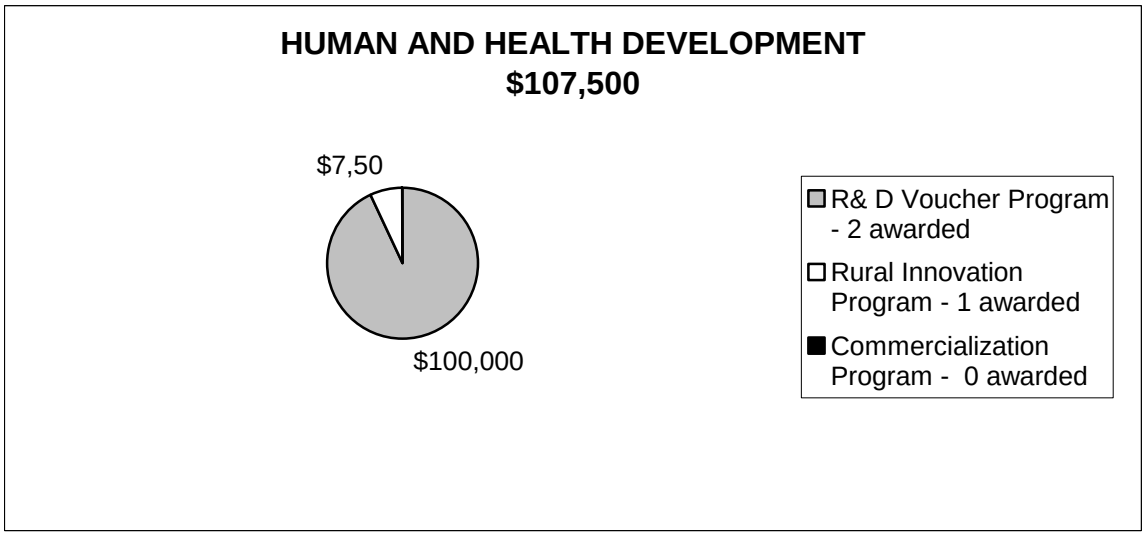
5. Spotlight

- Researchers at Western Kentucky University are developing a new class of materials derived from natural products. With a patented and newly developed processing approach, wood is used to produce carbon-polymer composites with unique characteristics suitable for the specialty wood-products market.

E. Total CIP Awards, by Research Priority Area, 2002-03

A total of $1,025,911 was awarded in 2002-03. The funds were awarded as follows:

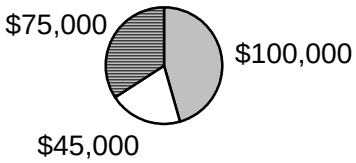




ENVIRONMENTAL & ENERGY TECHNOLOGIES
$72,500

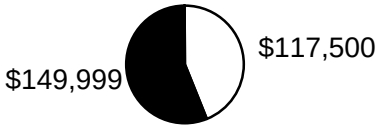
- R& D Voucher Program - 0 awarded
- Rural Innovation Program - 6 awarded
- Commercialization Program - 0 awarded

INFORMATION TECHNOLOGY & COMMUNICATIONS
$220,000

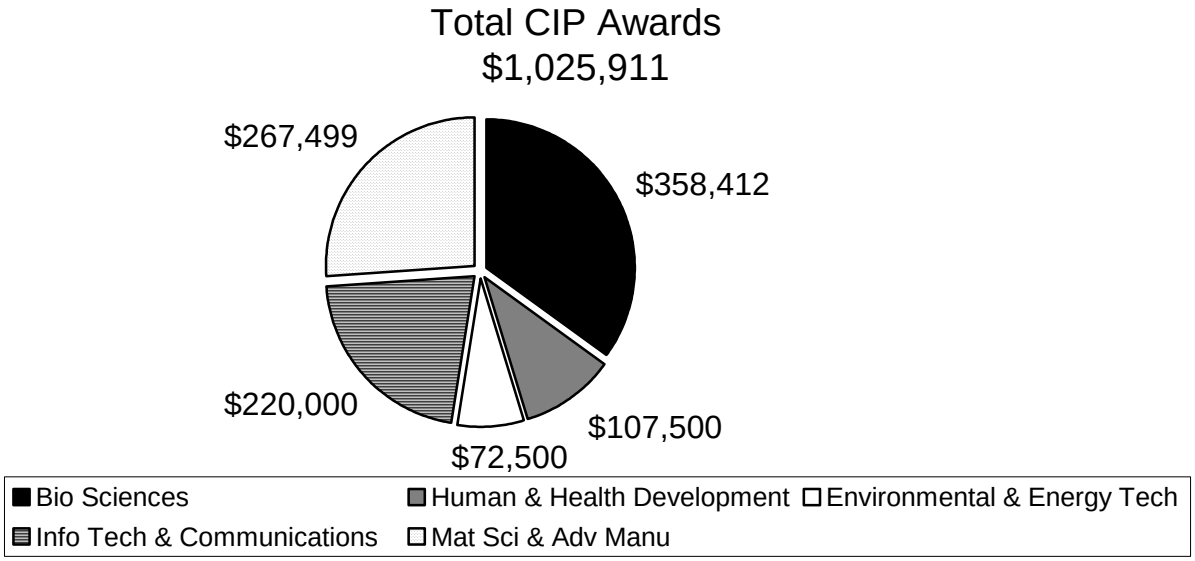


- R& D Voucher Program - 2 awarded
- Rural Innovation Program - 8 awarded
- Commercialization Program - 0 awarded
- Early Concept - 3 Awarded

MATERIALS SCIENCE & ADVANCED MANUFACTURING
$267,499



- R& D Voucher Program - 0 awarded
- Rural Innovation Program - 13 awarded
- Commercialization Program - 2 awarded


Total CIP Awards
$1,025,911
$267,499
$358,412
$220,000
$107,500
$72,500
Bio Sciences
Human & Health Development
Environmental & Energy Tech
Info Tech & Communications
Mat Sci & Adv Manu

V. Kentucky Science and Engineering Foundation

$1,496,773, Carried forward from FY 2001-02, $1,770,600, FY 2002-03

1. Purpose

The Kentucky Science and Engineering Foundation was created in House Bill 572, 2000 Regular Session, to build R&D excellence in the Commonwealth, particularly in Kentucky's priority research focus areas. KSEF is operated by KSTC through a contract with the Council. KSEF makes investments in peer-reviewed science and engineering research and is charged with attracting more research funding from all sources to the Commonwealth.

KSEF had available $1,496,773 in 2002-03 from unspent 2001-02 funds and was appropriated $1,770,600 in 2002-03. KSEF funded 53 grant proposals in 2002-03, for a total of $2,155,807 in research grants. This amount includes 10 SBIR grants not funded with state money.

The KSTC board of directors established four KSEF program priorities: exploratory advanced research, purpose-driven research, emerging technologies, and emerging ideas. Research is undertaken on high-risk, untested, novel ideas that allow researchers to venture into emerging areas. Research results are likely to be used as preliminary results in competing for federal funds and in researchers recognition as pioneers.

Each proposal is peer reviewed by technical experts outside Kentucky. Consideration is given to the quality of the research, matching funds, the benefit to the state, and the research focus in Kentucky when making awards.

Table 8. Kentucky Science and Engineering Foundation, 2002-03

	2002-03
Brought Forward	1,496,773
Allocation	1,770,600
Interest	55,939
Subtotal	**3,323,312**
Awards	(2,155,870)
Administration	(477,514)
Current Balance	**689,928**

2. Recommendation and Approval Process

The KSEF Advisory Board is composed of scientists, engineers, and administrators from academic and corporate sectors in Kentucky and other states.

Dr. Mahendra Jain is Executive Director of the Foundation. The KSEF Advisory Board members are:

- the University of Kentucky (Dr. Wendy Baldwin) and University of Louisville (Dr. Nancy Martin) Vice Presidents of Research,
- two EPSCoR members from the comprehensive universities (Dr. Blaine Ferrell, Western Kentucky University, and Dr. Tejinder Kochhar, Kentucky State University),
- one member from an independent college or university (Dr. James Miller, Transylvania),
- three corporate representative (Roger Dingus, UPS; Ed McInerney, General Electric; John Zbrozek, Lexmark International),
- and three members with science and engineering connections outside Kentucky (Dr. Charles Kupchella, University of North Dakota; Dr. Charles Wyman, Dartmouth College; and Dr. Jennie Hunter-Cevera, University of Maryland, Biotechnology Institute).

3. 2002-03 Awards

Table 9. KSEF award distribution, 2002-03

KSEF-Emerging Ideas ($276,636)					
Organization/Affiliate (Location)	Location	Applicant	Project Description	Fund	Award
University of Kentucky	Fayette	Czarena Crofcheck, Pinar Menguc	Development of an on-line sensor to monitor bubble size and the amount of liquid in the foam layer during the recovery of proteins (including pharmaceutics, enzymes, antibodies) by foam fractionation.	KSEF-Emerging Ideas	$15,000
University of Kentucky	Fayette	Balazs Siminszky	Identification and application of aptamers to recognize herbicides in the development of technology that will monitor pesticides in the environment	KSEF-Emerging Ideas	$14,850
University of Kentucky	Fayette	Clair Hicks, Peter Crooks	Development of bioactive probes to kill select bacteria and reduce antibiotic resistance in other bacteria	KSEF-Emerging Ideas	$15,000
University of Kentucky	Fayette	Jun Zhang, Fuqian Yang	Understanding the effect of high temperature on the thermal mechanical behavior and the resultant damage of soft skin tissues	KSEF-Emerging Ideas	$14,705
University of Kentucky	Fayette	David Atwood	Removal of uranium from groundwater with hexafluorosilicate	KSEF-Emerging Ideas	$14,771
University of Kentucky	Fayette	Anita Lee-Post	Study of the issues in designing, developing, and delivering Web-based distance learning programs.	KSEF-Emerging Ideas	$15,000
University of Kentucky	Fayette	Fuqian Yang	Understanding of subsurface damage in the lapping of silicon wafers	KSEF-Emerging Ideas	$15,000
University of Kentucky	Fayette	Gang Cao	Use of the pulsed laser deposition technique for combining multi-layer metal oxides with chemical or crystallographic incompatibility into a generic material with a structurally compatible application in solid state electronic devices.	KSEF-Emerging Ideas	$15,000

KSEF-Emerging Ideas ($276,636)					
Organization/Affiliate (Location)	Location	Applicant	Project Description	Fund	Award
University of Kentucky	Fayette	Lynn Penn	Development of new nanomaterial composites for reinforcing polymer matrices	KSEF-Emerging Ideas	$11,000
University of Kentucky	Fayette	M. Pinar Menguc, M. Aslan	Development of an experimental system to determine size distribution of metallic nanoparticles using polarized light for applications in industrial processing.	KSEF-Emerging Ideas	$15,000
University of Kentucky	Fayette	Dusan Sekulic	Creation of engineering tools for an integrated approach to exergo-environomic analysis for synthesis and reliable assessment of materials processing in advanced, energy intensive and environmentally sensitive manufacturing.	KSEF-Emerging Ideas	$15,000
University of Kentucky	Fayette	Jamey Jacob	Development of a system to test the aerodynamic effectiveness of changing the shape of a wing by "morphing" it rather than using higher drag producing mechanical devices such as flaps, slats or ailerons to control its lift.	KSEF-Emerging Ideas	$14,493
University of Kentucky	Fayette	Michael Montross, Czarena Crofcheck, Adam Berkovich	Investigation of the thermochemical conversion by mild solvent extraction (MSE) of biomass to value-added materials, otherwise produced with petroleum based feedstocks.	KSEF-Emerging Ideas	$15,000
University of Louisville	Jefferson	Kyung Kang	Development of nano gold particles for enhancing the ability of fiber optic immuno biosensors for disease diagnosis and prevention.	KSEF-Emerging Ideas	$15,000
University of Louisville	Jefferson	Christopher Richards	Development of a method to estimate impact forces during a simulated cardiac cycle to achieve improved reliability of artificial heart valves	KSEF-Emerging Ideas	$13,841
University of Louisville	Jefferson	Peter Quesada, John Lilly	Providing individuals with control over their own Low-Load Passive Stretch (LLPS) therapy by utilizing patient controlled LLP devices with pneumatic muscles	KSEF-Emerging Ideas	$14,945
University of Louisville	Jefferson	William Ehringer, Sufan Chien	Delivery of an immediate source of energy to combat ischemia	KSEF-Emerging Ideas	$14,844
Western Kentucky University	Warren	Cathleen Webb	Development of an inexpensive remediation technology for removal or reduction of arsenic from rural water sources	KSEF-Emerging Ideas	$13,825
Western Kentucky University	Warren	Tzu-Liang (Bill) Tseng, Yalcin Ertekin	Development and application of data mining and fuzzy mathematical approaches to control the surface roughness with changing process condition in metal cutting	KSEF-Emerging Ideas	$14,362

KSEF-Exploratory Advanced Research ($715,039)					
Organization/Affiliate (Location)	Location	Applicant	Project Description	Fund	Award
Northern Kentucky University	Campbell	Keith Walters	Exploration of two new "building blocks" for use in supramolecular systems in the design of molecular devices for use in energy conversion (e.g., solar cells) and transport (e.g., molecular wires).	KSEF-Exploratory Advanced Research	$44,669
University of Kentucky	Fayette	Caicheng Lu, Dayong Gao	Development of a novel technology using electromagnetic resonance for the rapid and uniform warming of cryopreserved living cells and organs.	KSEF-Exploratory Advanced Research	$99,971
University of Kentucky	Fayette	Yi-Tin Wang	Improvement of the understanding of biological oxidation of arsenic in the development of alternative removal and bioremediation techniques for arsenic contaminated soils, mining refuse, sediments, and groundwater.	KSEF-Exploratory Advanced Research	$98,938
University of Kentucky	Fayette	Raymond LeBeau	Application of computational mathematics to configure and control small-scale air jets on the surface of an airfoil wing to maximize flight performance.	KSEF-Exploratory Advanced Research	$73,184
University of Kentucky	Fayette	Fuqian Yang	Development of nanomechanical and micromechanical testing techniques for nanostructured materials in aerospace and automobile industries.	KSEF-Exploratory Advanced Research	$85,172
University of Louisville	Jefferson	Robert Buchanan, Craig Grapperhaus	Study of the design and dynamics of one-dimensional water channels for their role in relating proton/water mobility to ion/electron transfer.	KSEF-Exploratory Advanced Research	$99,790
University of Louisville	Jefferson	Teresa Fan, Mariusz Ratajczak, Andrew Lane	Development of a new approach to studying megakaryopoiesis (the process that leads to formation of peripheral blood platelets) through the use of NMR (Nuclear Magnetic Resonance) and mass spectrometry.	KSEF-Exploratory Advanced Research	$99,913
University of Louisville	Jefferson	Mehmed Kantardzic, A. Kumar, E. Elmaghraby	Development of intelligent web services for distributed data mining that will hide the complexity of Internet resources, and enable the user to specify a data mining task easier, without specific technical details.	KSEF-Exploratory Advanced Research	$65,135
Western Kentucky University	Warren	Bruce Kessler	The use of fractal functions to improve the industry standards of image processing for image compression, edge detection, denoising, and image enhancement.	KSEF-Exploratory Advanced Research	$48,267

KSEF-Purpose-Driven Research ($473,512)					
Organization/Affiliate (Location)	Location	Applicant	Project Description	Fund	Award
University of Kentucky	Fayette	Robert Lodder	Development of an innovative method of serum analysis using multidimensional spectroscopy to improve the cost effectiveness of lipoprotein screening for the prevention of heart attack and stroke.	KSEF-Purpose-Driven Research	$60,000
University of Kentucky	Fayette	Daniel Tao, Rick Honaker	Development of a significantly lower-cost, innovative flotation process for enhanced recovery of coarse and ultra fine coal to increase the competitiveness of Kentucky's coal energy industry, make good use of fine coal as a significant energy source, and mitigate environmental pollution caused by fine coal slurry.	KSEF-Purpose-Driven Research	$85,809
University of Kentucky	Fayette	Paul Dunbar, Rhonda Lee-Desautels	Development of re-chargeable batteries containing depleted Uranium as a useful approach to recycling tons of Uranium remaining from gaseous diffusion plant processing.	KSEF-Purpose-Driven Research	$80,000
University of Kentucky	Fayette	David Puleo, Chris Langub, Mark Thomas	Application of new bone regeneration technologies for repairing bone defects through timed-release of factors that lead to growth of bone having quality microarchitecture.	KSEF-Purpose-Driven Research	$60,000
University of Kentucky	Fayette	Rodney Andrews, Mark Meier	Development of ultrahigh strength carbon nanotube composite fibers for structural applications.	KSEF-Purpose-Driven Research	$59,999
University of Louisville	Jefferson	Suraj Alexamder	Studies in mold design, monitoring and diagnostics to improve productivity and quality in the process of plastics injection molding.	KSEF-Purpose-Driven Research	$67,762
Western Kentucky University	Warren	Cathleen Webb	Development of an inexpensive remediation technology system using limestone for removal or reduction of arsenic from rural water sources to solve significant environmental and health problems.	KSEF-Purpose-Driven Research	$59,942

KSEF-Emerging Technologies ($652,833)					
Organization/Affiliate (Location)	Location	Applicant	Project Description	Fund	Award
Potentia Pharmaceuticals LLC (Louisville)	Jefferson	Cedric Francois, Pascal Deschatelet, Paul Olson	Development of biosensors capable of detecting, in real time, multiple pathogens, toxins, or other molecules in biological samples such as water, food, air, and blood.	KSEF-Emerging Technologies	$80,000
University of Kentucky	Fayette	Clair Hicks, Peter Crooks	Development of a system using bacteriophage from non-disease carrying bacteria to deliver antibiotics and reporter molecules to select cells as a model for pathogenic organisms.	KSEF-Emerging Technologies	$80,000
University of Kentucky	Fayette	B.K. Parekh	Evaluation of a new technique known as “Paste Thickening Technology” to the waste slurry generated by coal plants in order to eliminate or reduce the need for coal slurry ponds.	KSEF-Emerging Technologies	$79,998

KSEF-Emerging Technologies ($652,833)					
Organization/Affiliate (Location)	Location	Applicant	Project Description	Fund	Award
University of Kentucky	Fayette	Lance DeLong, Bruce Hinds	Fabrication and soft x-ray characterization of magnetic thin film materials of nanometer dimensions for their potential application in device technologies such as quantum computing and microwave receivers/transmitters.	KSEF-Emerging Technologies	$96,334
University of Kentucky	Fayette	Madhu Menon	The use of metal-semiconductor wires in the fabrication of micro-electronics to exponentially boost computer power.	KSEF-Emerging Technologies	$80,000
University of Kentucky	Fayette	Tony Zhai, Michael Effgen	Improvement of the magnetic and mechanical properties of magnets and cost effectiveness of producing them for quality-critical applications such as aerospace vehicles, missiles and medicine.	KSEF-Emerging Technologies	$78,472
University of Kentucky	Fayette	Vijay Singh, Bruce Hinds	Development of a new fabrication technique for depositing nanomaterials that is specially well suited for the fabrication of nano-heterostructures.	KSEF-Emerging Technologies	$78,201
University of Louisville	Jefferson	Steven Koenig, Lauren Unger	Development of data acquisition and analysis software that is compliant with Good Laboratory Practice (GLP) regulations as required for Food and Drug Administration approval of pre-clinical laboratory studies of medical devices and therapies.	KSEF Emerging Technologies	$79,828

KSEF-Phase '0' ($37,850)					
Organization/Affiliate (Location)	Location	Applicant	Project Description	Fund	Award
Buswell Energy (Berea)	Madison	Harrie Buswell	Engineering to determine and demonstrate the feasibility of a new type of transformer for electric power distribution.	KSEF-Phase '0'	$4,000
Buswell Energy (Berea)	Madison	Harrie Buswell	Magnetic component material enhancement utilizing nanotechnology for new lower-frequency coils and transformers.	KSEF-Phase '0'	$4,000
C2 Enterprises, LLC	Fayette	Constance Zimmer	Good Genes Gone Bad-Cell Growth Normal and Abnormal	KSEF-Phase '0'	$3,850
dbaDIRECT (Florence)	Boone	John Bostick	Knowledge-Based Event Management System for Database Management	KSEF-Phase '0'	$4,000
Neuronetrix (Louisville)	Jefferson	Dennis Molfese	A neuronet detection system for diagnosing dyslexia and learning disabilities in Infants	KSEF-Phase '0'	$4,000
Regnerex, LLC (Prospect)	Jefferson	Suzanne Ildstad	Facilitating cells to induce tolerance in the transplanted bone marrow product	KSEF-Phase '0'	$2,500
Regnerex, LLC (Prospect)	Jefferson	Suzanne Ildstad	Facilitating cells to induce tolerance in the transplanted bone marrow product	KSEF-Phase '0'	$3,500
Spire Group LLC dba microPersonal Interfaces (Louisville)	Jefferson	Anthony Werle	Articulation and repetitive motion in information appliance interfacing	KSEF-Phase '0'	$4,000
Statitical Consulting of Louisville (Louisville)	Jefferson	Patricia Cerrito	Text Mining Software for Medical Applications	KSEF-Phase '0'	$4,000
Tire Ball Development Corporation (location)	Jefferson	Wade Summers	Multiple-cell inflation method provides flat proof qualities and ride comfort to farm tires such as those used on all-terrain vehicles (ATV's).	KSEF-Phase '0'	$4,000

4. Spotlight

- All cells of the body require oxygen. Many life-threatening conditions, such as heart attack, stroke, and surgical procedures involve ischemia (low oxygen), which can cause death. Dr. William Ehringer at the University of Louisville School of Medicine has found a way to deliver energy directly to cells and bypass cells' need for oxygen;

- Western Kentucky University's Dr. Cathleen Webb has developed a novel, inexpensive, arsenic-removal system for rural and home drinking water supplies.

VI. Experimental Program to Stimulate Competitive Research $2,751,000 million, FY 2002-03

1. Purpose

EPSCoR was created in 1978 in response to congressional concern over the inability of some states to compete for federal research and development grants and contracts. Kentucky began participating in the program in 1986 and since that time scientists and engineers at the Commonwealth's universities have received awards from all major federal agencies with EPSCoR programs: Department of Energy, Department of Defense, Environmental Protection Agency, NASA, National Institutes of Health, National Science Foundation, and the Department of Agriculture.

The Kentucky EPSCoR program is a leader in building a statewide infrastructure that promotes national research competitiveness. The Kentucky EPSCoR programs have helped advance development of Kentucky's two research institutions as preeminent research-intensive universities and cultivated talent in mathematics, science, and engineering research, and education, contributing significantly to Kentucky's postsecondary education reform. Kentucky's scientists and engineers have won awards from all of the federal EPSCoR programs for which the state is eligible and hundreds of faculty and students at 18 colleges and universities in the Commonwealth have participated in EPSCoR projects.

Kentucky institutions have leveraged their EPSCoR funds to build infrastructure and conduct research that now make them eligible and competitive for federal research dollars outside of EPSCoR.

Kentucky EPSCoR's program's mission is to enhance the research and intellectual capacity of Kentucky universities and colleges by building and coordinating strategic investments in human capital and the physical infrastructure necessary for Kentucky to compete for federal R&D funding. To date, $100 million in federal EPSCoR funding has been received, and much of that research has helped EPSCoR researchers to compete successfully for an additional $175 million from non-EPSCoR sources.

Kentucky EPSCoR also promotes creation and expansion of industry-university partnerships. Through collaborative efforts and cooperative funding, these partnerships are able to support the continuum of student learning through goal-oriented research, build the technological infrastructure essential to ensure a competitive Kentucky economy, and develop thriving industries in Kentucky, conceived and implemented by new, entrepreneurial firms.

Table 10. Kentucky Experimental Program to Stimulate Competitive Research , 2002-03

	2003
Brought Forward	77,824
Appropriation	2,751,000
KSTC Interest	270
Subtotal	**2,829,094**
Awards	(2,631,000)
Administration	(188,000)
Balance	**10,094**

2. Recommendation and Approval Process

The Statewide EPSCoR Committee, composed of leading scientists, university administrators, and representatives from the private and public sectors, manages Kentucky EPSCoR. It operates as a quasi-independent committee of the KSTC, which houses the Statewide EPSCoR Committee office.

Dr. Rick Kurzynske is Director of the Kentucky EPSCoR program and Dr. Wimberly Royster is the Kentucky EPSCoR Chair. The Statewide Committee is composed of 19 members with statewide representation. Members include six university administrators, seven faculty researchers, and six private/public representatives. The university administrators must have experience in basic science and engineering supported by federal agency EPSCoR programs. The faculty members must have well-established records of external funding in basic science and engineering supported by federal agency EPSCoR programs. The private/public sector representatives must have backgrounds in science and/or engineering. All members of the Statewide EPSCoR Committee are expected to have an understanding of current science policy and related areas.

Members of the Statewide EPSCoR Committee are:

Ms. Judi Streepey, Vice Chair;
Mr. Richard Alloo, General Manager, Toyota Motor Manufacturing North American, Inc.;
Dr. Wendy Baldwin, Vice President for Research, University of Kentucky;
Dr. Del Collins, Associate Vice President for Research, University of Kentucky;
Dr. David Cohn, Department of Biological & Biophysical Sciences, School of Dentistry, University of Louisville;
Dr. Blaine Ferrell, Dean, Ogden College of Science, Health & Technology, Western Kentucky University;
Dr. Eric Grulke, Advanced Carbon Materials Center, University of Kentucky;
Dr. Rick Kurzynske, Lexington, Kentucky, *ex officio*;
Dr. T.S. Kochhar, Department of Biology, Kentucky State University;

Dr. John Mateja, Director, Undergraduate Research and Scholarly Activities, Murray State University;
Dr. Nancy Martin, Vice President of Research, University of Louisville;
Dr. Rogers Redding, Vice President for Academic Affairs and Provost, Northern Kentucky University;
Dr. Bob Stout, Chairman, Dept of Microbiology, University of Louisville;
Mr. Ken Tuggle, Frost, Brown, Todd LLC, Louisville, Kentucky;
Dr. David White, Center for Reservoir Research, Murray State University; and

EPSCoR Subcommittee Chairs are:

Dr. Richard Hackney, Chair, NASA EPSCoR Program, Department of Physics & Astronomy, Western Kentucky University;
Dr. Darrell Chenoweth, Chair, DoD EPSCoR Program, Department of Electrical Engineering, University of Louisville;
Dr. John Connolly, Chair, NSF EPSCoR, University of Kentucky; and
Dr. John Stencel, Chair, DOE EPSCoR Center for Applied Energy Research, University of Kentucky; and
Dr. David White, Chair, EPA EPSCoR, Murray State University.

The Statewide Committee spearheads new policies and resources, promotes rigorous merit review processes, keeps EPSCoR responsive to state and regional needs, and cultivates broad-based support for science, technology, and innovation. The committee works with and through a network of dedicated federal, academic, public, and private sector partners and coordinates the activities of its subcommittees, which are responsible for individual agency programs. It also ensures that research supported by EPSCoR has the potential to meet national research and development standards of excellence and is consistent with Kentucky's economic and human resource development goals.

3. Spotlight

EPSCoR contributions to Kentucky include:

- $15 million in infrastructure awards slated for Kentucky through Kentucky NSF EPSCoR ($9.0 million) and NIH EPSCoR ($6.0 million) programs;

- $2.1 million in space-related R&D funding obtained by Kentucky NASA EPSCoR. It supports faculty and students at the University of Kentucky, University of Louisville, Murray State University, and Western Kentucky University. Kentucky was one of only four states to receive the maximum amount of funds available;

- $500,000 in environmental R&D awarded to Kentucky EPA EPSCoR. Only five grants were awarded in the US;

- $4.5 million in defense-related R&D funding was secured by Kentucky DoD EPSCoR;

- $16.5 million received for two NIH Center of Biomedical Research Excellence (COBRE) grants. Kentucky was one of only three EPSCoR states to receive two awards;

- Over $3 million in federal funding to Kentucky industries for pre-commercialization R&D leveraged through initial Small Business Innovative Research funding from Kentucky EPSCoR. This benchmark progress included the first ever award from the NIST Advanced Technology Program for $1.85 million.

- Using Kentucky DOE EPSCoR support, Western Kentucky University developed a sensitive elemental detection system based on nuclear physics R&D. The intellectual property created is now commercialized within an online coal characterization instrument at the Tennessee Valley Authority, used by United Nations peacekeepers to locate small land mines, and applied by the European Union to locate and identify chemical agent weapons;

- In follow-on, sustained funding after Kentucky NASA EPSCoR support, university researchers secured $7.3 million in grants, produced 55 refereed and 126 other publications, and developed 5 additional invention disclosures and patent applications. The return on investment for state funds to NASA EPSCoR is 9:1;

- A research focus on ecological studies at Kentucky Lake Reservoir by Murray State University is based upon accomplishments fostered by two EPSCoR awards. Infrastructure created by EPSCoR aided Murray in receiving $1.5 million from the Howard Hughes Medical Institute for bio-medical science research and instruction.

4. 2002-03 Matching Funds

Table 11. Kentucky EPSCoR allocations of state matching funds, FY 2002-03

	Actual Expenditures or Commitments	*Federal Match*
NSF EPSCoR	$1,523,671	$3,000,000
DOE EPSCoR	400,000	400,000
DOD EPSCoR	0	0
NASA EPSCoR	200,000	914,315
EPA EPSCoR	130,000	225,208
NIH	0	8,579,405
Pipeline (Infrastructure)	377,329	0
EPSCoR Management (KSTC)	188,000	0
Total	**2,819,000**	**13,118,928**

VII. Initiatives Related to Kentucky Knowledge-based Economy

A. Endowment Match Program ("Bucks for Brains")

The Endowment Match Program, operationalized through the Research Challenge Trust Fund and the Regional University Excellence Trust Fund, combines public monies and extramural funding to support research at UK and UofL and to strengthen key programs at the comprehensive universities.

The total amount appropriated for the 1998-2000 biennium was $110 million, with $100 million to the research universities and $10 million to the comprehensive universities. UK receives two-thirds and UofL receives one-third of the $100 million. Funding for the comprehensive universities is based on each university's proportional share of state appropriations. The $110 million has been leveraged with private donations to create a $220 million research pool.

The Endowment Match Program amount appropriated for the 2000-02 biennium was $120 million, with $100 million to the research universities and $20 million to the comprehensive universities. This second round of funding was distributed under the same formula as the first round, and is being leveraged to create another $240 million research pool.

A third round of $120 million was approved in 2002-04, but was funded by issuing state bonds instead of direct appropriation from the general fund. It also will be distributed under the original formula and will generate additional $240 million research funding.

"Bucks for Brains" has increased the number of endowed chairs from 55 to 173 and endowed professorships from 53 to 232 in Kentucky's public universities as of June 30, 2003. This program also has helped the universities in their efforts to compete for federal research funds. Extramural funding for grants and contracts at UK and UofL have increased dramatically from $122 million in 1997 to $325 million in 2003. In addition, Bucks for Brains faculty have a measurable and significant positive economic impact on their communities.

UK has estimated that the employment, income, and output impacts of externally supported research lead to 7,633 jobs in Kentucky in fiscal year 2002-03. This figure includes jobs at the University and additional jobs supported throughout the state due to spending resulting from these research activities. UK also estimated that research from out of state sources contributed approximately $142.7 million in personal income to people in Kentucky and approximately $290.6 million in total output to the Kentucky economy.

UofL estimates the local impact of Bucks for Brains to be 1.8 times the amount of funding attracted. For every $10 million of sponsored research at UofL, 265 jobs are created, $16 million new annual revenue for local businesses is generated, and $750,000 in new tax revenues are created.

B. R&D Goals

The University of Kentucky and the University of Louisville have accepted the challenge to increase federal and other extramural annual research expenditures from $173 million in 2000 to $500 million by 2010 and to $1 billion by 2020. These expenditure goals have become statewide policy goals. UK and UofL also have set goals to increase endowments and expenditures in the statewide research priority areas identified in the KIC plan.

UK endowments in the research priority areas are projected to increase from $167 million in 2001 to $222 million in 2006, and expenditures from endowments and gifts in the research priority areas will increase from $9.4 million to $14.3 million.

UofL endowments in the research priority areas are projected to increase from $103 million to $168 million and expenditures to increase from $2.3 million to $3.6 million.

Investments in university faculty and facilities are being targeted strategically to achieve these R&D funding goals.

C. Innovation and Commercialization Centers

The Cabinet for Economic Development's Office for the New Economy created the Innovation and Commercialization Center program in 2001. The ICCs are public/private partnerships that assist the Commonwealth's entrepreneurs and scientists to commercialize technologies that demonstrate significant market potential.

The ICC network serves entrepreneurs who want to create technology-based companies and scientists who want to commercialize technology. The ICCs help scientists and entrepreneurs in the start-up and investment process. The goals of the network are to increase quality deal flow of investments in technology-based firms in Kentucky, increase understanding of entrepreneurship, start-up processes, and investment practices, and provide value-added services to existing businesses, start-up businesses, and the investment community.

The ICC offices are located at Eastern Kentucky University, Murray State University, Northern Kentucky University, University of Kentucky, University of Louisville, and Western Kentucky University. The six ICCs bring together individuals from the business sector, universities, KCTCS, local communities, and state government to create and expand knowledge-based companies. KSTC provides centralized support services. Fourteen satellite centers will serve the needs of rural areas and will be housed in KCTCS for administrative support.

VIII. Benefits to Kentucky Citizens

Research and commercialization are dynamic enterprises encompassing both traditional scholarship and emerging technologies. Kentucky researchers are discovering new knowledge, advancing the economic growth, and are producing results that benefit Kentuckians. Following are some examples of ongoing research at Kentucky postsecondary institutions.

- Eastern Kentucky University's Justice and Safety Center has received a $15 million grant from the U.S. Department of Justice to work closely with the Center for Rural Development to address issues of interoperability between law enforcement, public safety, and "first responder" agencies in Eastern Kentucky and to test prototypes of emerging safety and security technologies for the national justice and safety community;

- A honey processing machine used to bottle honey was developed by a beekeeper from South Africa for Kentucky State University. This is the first time a machine of this capability has been built in the state of Kentucky. The machine was manufactured by the Kelly Company and presented to the Letcher County Agriculture office for use by present and potential beekeepers;

- The Center for Educational Research and Leadership at Morehead State University seeks to improve educational opportunity and human capital development in Appalachian Kentucky through educational research and dissemination of research results. In doing so, the Center strongly supports the equal opportunity goals set forth in the Kentucky Education Reform Act. The Center encourages faculty to use their expertise and research capability in collaboration with school districts, social service agencies, and local governments to build functional community support for educational achievement and attainment in Eastern Kentucky;

- Murray State University's Hancock Biological Station is a member of the Faculty Institutes Reforming Science Teaching project. The goals of the project are to build and maintain coalitions of faculty who will implement and sustain reform in undergraduate biology education at their colleges and universities, enable faculty to gain experience in inquiry-based science teaching and learning through workshops that model this kind of science-teaching, enhance faculty's ability to provide all students opportunities to gain scientific understanding through direct experience with methods and processes of inquiry in the field and in undergraduate science courses, and facilitate collaboration and communication among faculty about their reforms in biology teaching;

- Northern Kentucky University's Institute for Freedom Studies promotes interdisciplinary research, teaching, and community outreach grounded in the study of the Underground Railroad movement in the Middle Ohio River Valley.

From this basis in the study of the historical resistance to slavery, the NKU Institute for Freedom Studies fosters multicultural education as part of the never-ending struggle for human freedom and a fully democratic American society. The Institute partners with and helps empower grassroots community groups active in the study of local history, supports interdisciplinary academic research in the history and culture of the Underground Railroad, develops curricula and faculty opportunities for teaching about the Underground Railroad and related movements on all educational levels, and works in partnership with the National Underground Railroad Freedom Center in Cincinnati, Ohio;

- Western Kentucky University received a grant from the U.S. Department of Energy for a project to help reduce pollution from coal-fired power plants. The applied research program was started to help coal-fired power plants deal with current problems of operation and help develop strategies to meet environmental requirements. The project's primary objective is to establish an Environmental Control Technology Laboratory using a multifunctional circulating fluidized bed combustion system. The system can be configured easily to make combustion runs with various fuels under varying conditions to analyze and monitor air pollutant emissions, as requested by the lab's industrial partners. The project will help develop technologies that can be used to control emissions and the successful development of these technologies will provide scientific data for atmospheric pollutants resulting from combustion systems and the methodologies required to reduce the emission of these pollutants across the United States.

IX. Findings and Recommendations

Findings

- R&D and commercialization are long-term endeavors, which will require new investment funds, a deep pool of knowledgeable workers, and an entrepreneurial climate.

- New issues, including intellectual property rights and public policy implications of some kinds of research, will emerge as the knowledge-based economy programs are implemented, and future amendments to the Kentucky Innovation Act of 2000 may be necessary.

- To ensure the greatest return on state dollars invested, the Council must develop dynamic, strategic connections between postsecondary education, workforce, welfare, and economic development to promote postsecondary access and success; to align postsecondary education with current and emerging needs of business and industry; to promote participation of women and minorities; to open dialog to understand and respond to students' needs and expectations as they prepare for employment and business creation; and to nurture an entrepreneurial climate and culture.

Recommendation

- Secure funding for the Endowment Match Program and maintain the existing funding for the Commercialization Investment Programs, Innovation and Commercialization Centers, and Office for the New Economy programs [see Glossary].

Proposed Program Guideline Changes

- Amend the Council's guidelines and add the stipulation that a company that moves outside of the state within a specified period of time after receiving an award is subject to a penalty and must repay its award.

- Amend the Council's guidelines to allow a qualified company to comply with the legislative definition of the Kentucky-based qualification criteria through contractual language. The Kentucky-based stipulation is expensive for an applicant and burdensome to regulate. By changing it to a contractual requirement and adding a penalty for moving, the Council can accomplish the same result, keeping growing companies in Kentucky.

- Amend the Council's guidelines to allow a company to receive multiple awards if its projects are distinct.